

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Jiang et al.

Serial No.: 09/483,712

Filed: January 14, 2000

For: INTERMEDIATE STRUCTURES
FOR CHIP-SCALE PACKAGES HAVING
CARRIER BONDS (as amended)

Confirmation No.: 8743

Examiner: M. Warren

Group Art Unit: 2815

Attorney Docket No.: 2269-3815.1US
(98-0670.00/US)

VIA ELECTRONIC FILING
September 10, 2007

REPLY BRIEF

Mail Stop Appeal Brief – Patent
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attn: Board of Patent Appeals and Interferences

Sirs:

This Reply Brief is being submitted in response to the Examiner's Answer mailed July 11, 2007, and in accordance with the requirements of 37 C.F.R. § 41.41.

APPELLANT'S REPLY TO THE EXAMINER'S ANSWER

As set forth in Appellant's Appeal Brief, Appellant respectfully submits that the combination of United States Patent No. 5,677,566 to King et al. (hereinafter "King et al.") and United States Patent Application Publication No. 2001/001173 A1, filed by Havens et al. (hereinafter "Havens et al.") in the manner proposed by the Office is improper because the Office has not identified any objective evidence sufficient to support identification of any motivation in the prior art, common knowledge, or the nature of the problem itself for combining King et al. with Havens et al. in the proposed manner.

To establish a *prima facie* case of obviousness the prior art reference (or references when combined) **must teach or suggest all the claim limitations.** In re Royka, 490 F.2d 981, 985 (CCPA 1974); *see also* MPEP § 2143.03. However, "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." KSR Int'l Co. v. Teleflex Inc., 127 S. Ct. 1727, 1741 (2007). Additionally, **there must be "a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed.** KSR, 127 S. Ct. at 1742. Finally, to establish a *prima facie* case of obviousness there must be a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 1097 (Fed. Cir. 1986). Furthermore, the reason that would have prompted the combination and the reasonable expectation of success must be found in the prior art, common knowledge, or the nature of the problem itself, and not based on the Applicant's disclosure. DyStar Textilfarben GmbH & Co. Deutschland KG v. C. H. Patrick Co., 464 F.3d 1356, 1367 (Fed. Cir. 2006); MPEP § 2144.

Underlying the obvious determination is the fact that statutorily prohibited hindsight cannot be used. KSR, 127 S.Ct. at 1742; DyStar, 464 F.3d at 1367.

Rejection of Claims 1, 2, 5-9, 13-16, and 19 under 35 U.S.C. § 103(a)

Claims 1, 2, 5-9, 13-16, and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over King et al. in view of Havens et al. Appellant reasserts the arguments set forth in the Appeal Brief regarding patentability of claims 1, 2, 5-9, 13-16, and 19.

Claims 1, 2, 5-9, 13, 15, 16, and 19

As discussed in Appellant's Appeal Brief, Appellants assert that the prior art references do not teach or suggest the desirability of replacing the encapsulating material of the chip-scale package of King et al. with the hydrophobic hermetic covering taught by Havens et al., and attaching the external electrodes of King et al. prior to applying the hydrophobic hermetic covering of Havens et al.

The Office asserts that Havens et al. teaches that forming the hydrophobic hermetic covering last (i.e., after attaching the external electrodes) would "reduce moisture and improve product yield." Examiner's Answer, pages 5, 7-8. As the Office has pointed out, Havens et al., states at Page 2, Paragraph [0025] the following:

"This invention largely solves the moisture sensitivity problems associated with electronic packages (e.g. chip carriers) by covering substantially all of the external surfaces of the electronic package, with the exception of a portion of the conductors that are required for electrically coupling to an external substrate, with an essentially hermetic covering which is highly hydrophobic. . . . The protective covering then seals all the surfaces to which it is exposed, forming a barrier which greatly retards future moisture absorption. The reduced level of moisture

improves product yields and reliability thru the final assembly and testing processes.”

These statements, however, apply to all embodiments disclosed in Havens et al. They provide no evidence whatsoever that there is any benefit to attaching the external electrodes prior to forming the hydrophobic hermetic covering instead of attaching the external electrodes after forming the hydrophobic hermetic covering, as taught by King et al. In other words, even though Havens et al. teaches the benefits of a hermetic layer, it fails to suggest any motivation for attaching external electrodes before applying the hermematic covering.

While Havens et al. teaches that the carrier bonds may be attached to the electronic package either before or after applying the hermetic covering, there is no reason one of ordinary skill in the art would be motivated to further and unnecessarily modify the teachings of King et al. so as to attach the carrier bonds before applying the hermetic covering. In fact, nowhere in Havens et al. is any motivation for applying a hermetic covering associated with whether the carrier bonds are attached before or after application of the hermetic covering. Whether the carrier bonds are attached to the external electrodes of the device before or after applying the hermetic covering, substantially all of the external surfaces of the electronic package are covered by the hermetic covering, with the exception of a portion of the conductors that are required for electrically coupling to an external substrate. Therefore, Havens et al. teaches that the hermetic covering improves reliability and product yield **regardless** of whether the carrier bonds are attached before or after applying the hermetic covering.

The Office also cites Havens et al., Page 2, Paragraph [0026] as proving that “[i]f King were to read from Havens, King would realize that it is easier and quicker to form the carrier

bonds/solder balls first, then encapsulate the package, and ship it to the customer.” Examiner’s

Answer, Page 9. Appellants respectfully disagree. Havens et al., Page 2, Paragraph [0026] states that:

“ . . . all of the package, all of the external conductor surfaces, are covered (e.g., to facilitate shipment). In another embodiment, portions of the external conductor surfaces are exposed thus enabling immediate subsequent procession (e.g., solder reflow).”

There is simply no description, teaching, or suggestion in Paragraph [0026] or any part of Havens et al. as to how shipment of a package in which all of the external conductor surfaces are covered with the hermetic covering is improved, enhanced, or otherwise facilitated relative to shipment of a package in which substantially all of the external surfaces of the electronic package are covered with the hermetic covering, with the exception of a portion of the conductors that are required for electrically coupling to an external substrate, as in embodiments in which the carrier bonds are attached after applying the hermetic covering. In fact, Havens et al. expressly teaches that an electronic package having a “hydrophobic protective covering over substantially all of the external surfaces of the package, except for those portions of conductors that were covered by the cover layer,” is “ready for shipment.” Havens et al., Page 4, Paragraph [0047]. Thus, the Office fails to establish a reason that would have prompted a person of ordinary skill in the relevant field to combine the prior art elements.

Furthermore, Appellants respectfully reassert that one of ordinary skill in the art would recognize that, in methods in which the carrier bonds are attached after applying the hermetic covering, the electronic package could be shipped prior to attaching the carrier bonds, in which case, all of the package, including all of the external surfaces, would be covered by the hermetic

covering. Even if the benefit of facilitated shipment is generally associated with covering external surfaces, nowhere in the teachings of Havens et al. is the benefit of facilitated shipment dependent upon whether carrier bonds are attached before or after application of the hermetic covering, and thus, the prospect of facilitated shipment would not motivate one skilled in the art to attach carrier bonds before applying the hermetic covering.

In sum, there simply is no teaching or suggestion in the cited prior art references that any benefit would be achieved by attaching the carrier bonds to the external electrodes of the device taught by King et al. prior to applying the hermetic covering taught by Havens et al. In other words, the prior art references do not teach or suggest the desirability of attaching the carrier bonds to the external electrodes in the device taught by King et al. before applying the hermetic covering of Havens et al. instead of after applying the hermetic covering. In contrast, however, attaching the carrier bonds to the external electrodes of the device taught by King et al. after applying the hermetic covering taught by Havens et al. accords with the teachings of both Havens et al. and King et al. and would require less modification of the teachings of King et al. Therefore, it would not have been obvious at the time the present invention was made to one of ordinary skill in the art, considering the teachings of King et al. and Havens et al. in combination as a whole, to attach the carrier bonds to the leads of the device before applying the hermetic covering taught by Havens et al. to the device taught by King et al.

Appellants respectfully assert that the Office appears to be using improper hindsight and combining the cited prior art references solely on the basis of the Appellants disclosure in the present application. For example, the Office states that “[i]f King were to read from Havens, King would realize that it is easier and quicker to form the carrier bonds/solder balls first, then

encapsulate the package, and ship it to the customer.” Examiner’s Answer, Page 9. As explained above, nowhere in Havens et al. is this assertion taught or suggested, and the Office has not provided any reasons or evidence that it would in fact be “easier and quicker” to form the external electrodes before applying the hermitic covering. Appellants respectfully assert that the Office’s combination of references is made on the basis of the Appellants’ disclosure and is, therefore, statutorily prohibited.

Claim 14

Appellants submit that the obviousness rejection of Claim 14 is improper and should be reversed because the Office has failed to identify a sufficient motivation to combine the teachings of Havens et al. with the teachings of King et al. in the manner proposed by the Office, as previously discussed.

Appellants also assert that the obviousness rejection of Claim 14 is improper and should be reversed for the additional reason that King et al. and Havens et al., when combined, do not teach or suggest all the limitations of Claim 14. In particular, Appellants assert that King et al. and Havens et al., when combined, do not teach or suggest “[a] plurality of conductive carrier bonds [comprising] a conductive or conductor-filled polymer,” as recited in dependent Claim 14.

King et al. teaches that the external electrodes 28 (shown in Figures 1 through 5 and 8 thereof) may comprise solder balls (King et al., Column 2, Lines 23-26; Column 4, Lines 49-65), but does not teach or suggest that they may comprise a conductive or conductor-filled polymer. Similarly, Havens et al. teaches that the conductors 6 (shown in Figures 1, 1A, 1B, 2, 2A, 3, 3A, 4, 4A, 5, 6, 6A, and 7) thereof may comprise solder balls (Havens et al., Page 2, Paragraph

[0028]; Page 3, Paragraph [0030]; Page 4, Paragraph [0046]; Page 5, Paragraphs [0056]-[0058]), but does not teach or suggest that they may comprise a conductive or conductor-filled polymer.

The Office has asserted that King et al. teaches processes of forming carrier bonds other than that used for forming solder balls, and therefore, King et al. also teaches forming a carrier bond comprising a conductive or conductor filled polymer. Examiner's Response, Page 11.

Appellants respectfully disagree. King et al. Column 4, Lines 59-65 states:

“Other processes may also be used to form the external electrodes. For example, the electrodes may be ‘plated up’ using conventional plating techniques rather than formed using solder balls as described above. The completed semiconductor chip package can then be assembled to a printed circuit board or the like using conventional surface mount process and equipment.”

Although King et al. mentions the possible existence of other processes that may be used to form the external electrodes, it does not teach or suggest use of a conductive or conductor filled polymer.

Rejection of Claims 3, 4, and 10-12 under 35 U.S.C. § 103(a)

Claims 3, 4, and 10-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over King et al. and Havens et al. in further view of United States Patent No. 5,894,107 to Lee et al. (hereinafter “Lee et al.”). Appellant reasserts the arguments set forth in the Appeal Brief regarding patentability of claims 3, 4, and 10-12.

Claims 3, 4, and 10-12

Each of Claims 3, 4, and 10 through 12 depends either directly or indirectly from independent Claim 2, and, as a result, each includes the limitations recited in independent

Claim 2. Appellants assert that the U.S. Patent and Trademark Office (the “Office”) has failed to establish a *prima facie* case of obviousness with respect to Claims 3, 4, and 10 through 12 because the Office has failed to identify a sufficient motivation to combine the teachings of King et al. with the teachings of Havens et al. in the manner proposed by the Office.

As previously discussed above, King et al. and Havens et al., when combined, do not teach or suggest an intermediate structure as recited in independent Claim 2, from which each of Claims 3, 4, and 10 through 12 depends. The teachings of Lee et al. do not satisfy the deficiencies.

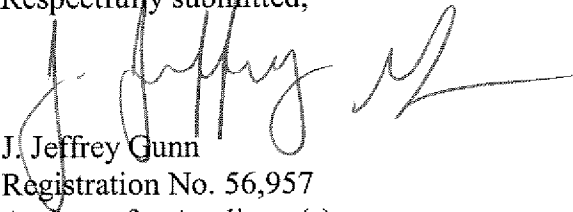
Lee et al. teaches providing a plurality of carrier bonds in the form of solder balls 16 on exposed upper surfaces of external connection means 34 *after* encapsulating a chip and lead frame assembly. Lee et al., Column 5, Lines 20-29, and 39-43; Figures 11-12. Therefore, Lee et al. also fails to provide any teaching or suggestion for forming external electrodes 28 on the external electrodes 12 of King et al. before providing a hermetic covering as taught by Havens et al. thereon in such a manner as to provide an intermediate structure as recited in independent Claim 2.

As there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the teachings of Havens et al. with the teachings of King et al. in the manner proposed by the Office, Appellants respectfully assert that the Office has failed to establish a *prima facie* case of obviousness with respect to each of dependent Claims 3, 4, and 10 through 12, and request that the Board overturn the rejection of these Claims under 35 U.S.C. § 103(a).

CONCLUSION

Appellants respectfully submit that Claims 1 through 16 and 19 are allowable over the cited references of record. Appellants respectfully request that the rejections of Claims 1 through 16 and 19 under 35 U.S.C. § 103(a) be reversed. Furthermore, pursuant to 37 C.F.R. § 41.43, Appellant respectfully requests acknowledgement of receipt and entry of the Reply Brief.

Respectfully submitted,



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Date: September 10, 2007

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